ZooKeys 356: 11–29 (2013)
doi: 10.3897/zookeys.356.6481
www.zookeys.org

RESEARCH ARTICLE

A peer-reviewed open-access journal
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The "*Taygetis ypthima* species group" (Lepidoptera, Nymphalidae, Satyrinae): taxonomy, variation and description of a new species

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Academic editor: *Carlos Peña* | Received 22 October 2013 | Accepted 14 November 2013 | Published 27 November 2013

http://zoobank.org/93538B7A-46EF-436B-B253-BEA0D120C1C7

Citation: Siewert RR, Zacca T, Dias FMS, Freitas AVL, Mielke OHH, Casagrande MM (2013) The "*Taygetis ypthima* species group" (Lepidoptera, Nymphalidae, Satyrinae): taxonomy, variation and description of a new species. ZooKeys 356: 11–29. doi: 10.3897/zookeys.356.6481

Abstract

A new species of *Taygetis* Hübner, [1819] (Lepidoptera, Nymphalidae, Satyrinae) from southeastern Brazil is described: *Taygetis drogoni* **sp. n.** In addition, *T. servius* Weymer, 1910 and *T. fulginia* d'Almeida, 1922 are resurrected from synonymy and a taxonomic discussion on the species *T. ypthima* Hübner, [1821] and *T. rectifascia* Weymer, 1907 is provided. A dichotomous key for the species is also provided.

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Keywords
Atlantic Forest, Euptychiina, Neotropical, *Pseudodebis*, *Taygetis rectifascia*

Introduction

The butterfly subtribe Euptychiina includes over 400 described species in 45 genera, being one of the most diverse groups in the subfamily Satyrinae (Lepidoptera, Nymphalidae) (Lamas 2004, Peña et al. 2010, Zacca et al. 2013). This group is predominantly Neotropical, but some species also occur in the Neartic region and in Southeast Asia (Peña et al. 2010, Matos-Maraví et al. 2013). The taxonomy of the group is among the most poorly known of all Neotropical butterflies, and the relationships within the subtribe are still in debate (Marín et al. 2011). Several genera are polyphyletic, new species and genera are regularly described, and the delimitation of the recognized genera and species needs much effort before a better understanding on the systematics of the group emerges (e.g. Freitas and Peña 2006, Freitas et al. 2011, in press, Zacca et al. 2013).

In a recent study based on molecular data, Peña et al. (2010) proposed a phylogenetic hypothesis of Euptychiina, and defined five major clades within this group. The "*Taygetis* clade" is one of those five major groupings and it includes 10 valid genera. A preliminary molecular phylogeny of the "*Taygetis* clade" (Matos-Maraví et al. 2013) gave insights on the non-monophyletic nature of most genera, and also revealed several new cryptic species waiting to be described. *Taygetis* appeared as polyphyletic, with *Taygetis kerea* Butler, 1869 and *Taygetis weymeri* Draudt, 1912 as part of the "*Taygetina* subclade", and with the clade *T. ypthima*+*T. rectifascia* (hereafter "*Taygetis ypthima* species group"), as part of the "*Pseudodebis* subclade" (Matos-Maraví et al. 2013).

The genus *Taygetis* comprises 27 described species and several undescribed species (Lamas 2004), which are widely distributed throughout the neotropics, from Mexico to Uruguay (Lamas 2004, Marín et al. 2011). Adult *Taygetis* are mid-sized to large butterflies, with brown dorsal wings and with the ventral surface resembling dried leaves (D'Abrera 1988). Some species are crepuscular and are easily captured using rotting fruit in bait traits (Murray 2001a, b). A number of species of *Taygetis* show high apparent intraspecific phenotypic variation, and some species have been described several times. For example, *T. virgilia* (Cramer, 1776) has five synonymized names (Lamas 2004).

Although intraspecific phenotypic variation appears to be common in several Euptychiina, in some cases hidden taxonomic diversity might be underestimated. Similar to *T. virgilia* (see above), *T. ypthima* is a highly variable species that has five synonymized names (Lamas 2004).

The present paper studied in detail the morphology of male and female genitalia and wing pattern variation of *T. ypthima*, and related species, such as its sister species *Taygetis rectifascia* Weymer, 1907 (Matos-Maraví et al. 2013). As a result, a new species of *Taygetis* from Brazil is described, and *T. servius* Weymer, 1910 and *T. fulginia* d'Almeida, 1922, synonyms of *T. rectifascia* and *T. ypthima* respectively (see Lamas 2004), were revalidated.

Methods

Dissections of the genitalia were made following standard techniques. The abdomen was removed, soaked in a heated 10% KOH solution for 5 minutes before dissection of the genitalia to analyze its structures. Illustrations were prepared with the aid of a camera lucida attached to a stereoscopic microscope. Genitalia terminology follows Oiticica-Filho (1946) and Niculescu (1972-1983). Distributional data were obtained from seven entomological institutions (see below) and, when possible, from the literature (Biezanko 1960, Ebert 1969, Kochalka et al. 1996, Krüger and Silva 2003, Iserhard and Romanowski 2004, Quadros et al. 2004, Uehara-Prado et al. 2004, Giovenardi et al. 2008, Paz et al. 2008, Bonfantti et al. 2009, Iserhard et al. 2010, Peña et al. 2010, Dolibaina et al. 2011, Pedrotti et al. 2011, Santos et al. 2011, Soares et al. 2011, Bellaver et al. 2012, Silva et al. 2012). Ventral and dorsal wings surfaces were photographed and their patterns compared to original descriptions. All previously described taxa were studied in detail, including photographs of type specimens and original descriptions. Dissections were made for individuals corresponding to all observed variation, including phenotypes corresponding to all available names for the species in this group.

All examined material belongs to the following institutions:

DZUP	Coleção Entomológica Padre Jesus Santiago Moure, Curitiba, Paraná, Brazil
UFMG	Universidade Federal de Minas Gerais taxonomic collection, Belo Horizonte, Minas Gerais, Brazil
ZUEC	Museu de Zoologia Adão José Cardoso, Universidade Estadual de Campinas, Campinas, São Paulo, Brazil
ZUEC-AVLF	André VL Freitas Collection, Universidade Estadual de Campinas, Campinas, São Paulo, Brazil
SMFL	Lepidoptera collection, Senckenberg-Museum, Frankfurt am Main, Germany
SMT	Staatliches Museum für Tierkunde, Dresden, Germany
ZSM	Zoologische Staatssammlung München, Germany

Results

***Taygetis drogoni* Siewert, Zacca, Dias & Freitas, sp. n.**
http://zoobank.org/CA6CEBB1-A525-44EE-A265-CE467707BFB5
http://species-id.net/wiki/Taygetis_drogoni
Figs 1A–D; 6A–E; 7A,B

Type material. Holotype male with the following labels (separated by transverse bars): /HOLOTYPUS/ *Taygetis drogoni* Siewert, Zacca, Dias & Freitas det. 2013/ M(#)/ 07-

Figure 1. Adults of *Taygetis drogoni* sp. n. **A–B** male **A** dorsal view **B** ventral view **C–D** female **C** dorsal view **D** ventral view. Scale bar = 1 cm.

II-1985 Cambuquira, M[inas] G[erais] [21°51'30"S, 45°17'28"W]. Mielke & Casagrande leg./ DZ 27.604/ (DZUP). Allotype female with the following labels (separated by transverse bars): /ALLOTYPUS/ *Taygetis drogoni* Siewert, Zacca, Dias & Freitas det. 2013/ F(#)/ 10-XII-1968 Camb[uquira], [Minas Gerais] [21°51'30"S, 45°17'28"W]./ Coleção H. Ebert/ DZ 27.607/ (DZUP).

Paratypes. BRAZIL – *Minas Gerais:* **Alfenas** – 14-XII-2011, 1female, Brito leg., JCI2.1-130 (ZUEC); 08-II-2012, 1 male, Brito leg., JCI3.2-225 (ZUEC). **Cambuquira** – 6-X-1968, 1 female, Ebert leg., ex-coll. Ebert, DZ 5.501 (DZUP); 10-XII-1968, 6 males, Ebert leg., ex-coll. Ebert, DZ 27.606, DZ 27.607, DZ 27.614, DZ 27.619, DZ 27.623, DZ 27.624 (DZUP); 900 m, 15-IV-1969, 3 males, Ebert leg., ex-coll. Ebert, DZ 27.605, DZ 26.419, DZ 27.620 (DZUP); 2-7-XI-1969, 1 female, Ebert leg. (SMFL); 15-V-1981, 1 male, Ebert leg., ex-coll. Ebert, DZ 27.618 (DZUP); 7-II-1985, 5 males, Mielke & Casagrande leg. DZ 27.621, DZ 27.431, DZ 27.616, DZ 27.626, DZ 27.627 (DZUP). **Caraça** - Santa Barbara, 1500 m, 1-5-II-1985, 1 male

and 1 female, Mielke & Casagrande leg. DZ 27.625, DZ 27.629 (DZUP). **Carmo do Rio Claro** – 1-VIII-1948, 1 male, Carvalho & Alceu leg. DZ 27.617 (DZUP). **Nova Lima -** APE Manancial Mutuca, Parque Estadual da Serra do Rola Moça, 1-V-2009, 1 male, Silva leg., DNA voucher PM 10-02 (ZUEC-AVLF). **São Roque de Minas –** Parque Nacional Serra da Canastra, 9-IV-1999, 1 male, without collector, UFMG ILE 1300506 (UFMG); 19-21-IV-1999, 2 males, without collector, UFMG ILE 1300504, 1300507 (UFMG). *São Paulo:* **São Luiz do Paraitinga –** 800 m, 22-IV-2004, 1 male, Ribeiro leg., ZUEC LEP 6.548 (ZUEC); 28-IX-2004, 1 male, Ribeiro leg., ZUEC LEP 6.548 (ZUEC); 29-IX-2004, 1 male, Ribeiro leg., ZUEC LEP 7.003 (ZUEC); 12-I-2005, 1 female, Ribeiro leg., ZUEC LEP 6.724 (ZUEC); 18-II-2005, 2 males, Ribeiro leg., ZUEC LEP 6.666, ZUEC LEP 6.691 (ZUEC).

Diagnosis. *Taygetis drogoni* sp. n. is very similar to *T. ypthima*, differing from the latter by the following characters: forewing with pale brown dorsal post discal band less contrasting than in *T. ypthima*; underside pale post discal band slightly constricted at M_3, tapering abruptly in CuA_1-CuA_2 and becoming conspicuously thinner or even absent from CuA_2 to the inner margin; hind wing underside with the discal line evenly curved and regular, extending from the costal margin to 1A; and dark post discal line straight and only slightly irregular. Tegumen larger and protruding; valva stouter and shorter, with a larger dorsal rough area. Signa dorsal; laterally, sternum VIII not fused with tergum VIII; lamella antevaginalis without process.

Description. *Head.* Brown. Post-genal area light brown. Eye glabrous, brown. Antennae without scales at apical third, mostly light brown; club dark brown with last flagellomere light brown. Labial palpus mixed with brown and light brown, with elongated scales at first and second segment; about 1.5 times total length of eye; third segment thin, same size as first. *Thorax.* Uniformly brown. Legs brown; meso- and metathoracic femurs light brown on inside. *Forewing, size and shape*: length: 34.5–37.0 mm (n = 23). Triangular, costal margin convex, apex pointed, outer margin convex, tornus rounded, inner margin straight. *Forewing upper side* (Fig. 1A,C). Mostly brown, darker along outer margin. *Forewing under side* (Figs 1B,D). Background brown, lighter at wing base. Dark brown scales at end of discal cell and whitish on transverse veins. Dark spot at base of M_2. Costal margin to external margin with reticulated markings. Apex rufous brown. Submarginal band whitish, from costal to inner margin, with reduced creamy ocelli in spaces R_5-M_1, M_1-M_2, M_2-M_3 and M_3-CuA_1; proximal border of submarginal band irregular with dark brown scaling, distal border of marginal band inconspicuous. Marginal line brown. Fringe light brown. *Hind wing shape:* Costal margin convex, apex rounded, external margin convex in M_1-M_2, projections at CuA_1, CuA_2 and 2A, with a developed one at M_3. Inner margin curved at base, slightly straight towards tornus. *Hind wing upper side* (Fig. 1A,C). Mostly brown, darker along outer margin. *Hind wing under side* (Fig. 1B,D). Background rufous brown, discal line dark brown and irregular. Dark brown spot at base of M_2. Submarginal band with reduced creamy ocelli, in spaces Rs-M_1, M_1-M_2, M_2-M_3 and M_3-CuA_1, ocellus on CuA_1-CuA_2 developed. Post discal line straight and dark brown. Proximal border of submarginal band along post discal line forming a 2 mm wide reddish fascia. Distal

border of marginal band inconspicuous. Marginal line brown, with distal area reddish. Fringe light brown. *Abdomen.* Dorsally brown, ventrally light brown.

Male genitalia (Fig. 6A–E). Tegumen dorsally convex, subtriangular in lateral view, ventral projection wide; appendix angular reduced. Uncus straight, down curved at apex and dorsally keeled. Gnathos larger than uncus; straight and projected dorsally, without a ventral projection at base. Anterior projection of saccus cylindrical, length equal to tegumen. Valva subrectangular, with dorsal projections at apical third; costa developed and subtriangular; ventrally covered by setae. Aedeagus straight, thin and larger than valva; opening of aedeagus almost the total length of posterior portion.

Female genitalia (Fig. 7A, B). Tergum VIII squared. Papillae anales with setae at distal portion, 2/3 higher than longer, sclerotized at basal half. Sterigma sclerotized, formed by a round lamella antevaginalis and a membranous pocket between ostium bursae and papilla anales. Bursa copulatrix totally membranous, with a pair of signa dorsally; ductus bursae thinned, with apical third sclerotized, about three times length of bursa copulatrix.

Etymology. The specific epithet refers to Drogon, one of the three dragons of Daenerys Targaryen, a fictional character from the George R. R. Martin's novel "A Song of Ice and Fire".

Distribution (Fig. 8). This species occurs in southeastern Brazil (Minas Gerais and São Paulo) at elevations from 800 to 1,500 m a.s.l.

Taxonomic comments. This species has presumably not been recognized in the past because of the intrinsic phenotypic variation within *Taygetis* and, in particular, within *T. ypthima,* the most similar and probably closest species to *Taygetis drogoni* sp. n. The species appears cited as *T. ypthima* in Ribeiro et al. (2012). In Matos-Maraví et al. (2013), *Taygetis ypthima* PM10-02 is in fact *T. drogoni* (one of the paratypes, see above). A real *T. ypthima* (*Taygetis ypthima* NW 149-8) is also included in that study, and it appears as sister to *T. drogoni* in the phylogeny presented in that paper. The genetic distances between these two specimens in the available COI and nuclear genes provide further support for the description of *T. drogoni* sp. n.

***Taygetis ypthima* Hübner, [1821]**
http://species-id.net/wiki/Taygetis_ypthima
Figs 2A–H; 6F–J; 7C,D

Examined material. BRASIL – *Bahia:* **Jitaúna** – 25-III-1969, 1 female, Ebert leg., ex-coll. Ebert, DZ 27. 720 (DZUP). Rio de Contas, 150 m, 4-III-1969, 1 female, H. Ebert leg., ex-coll. Ebert, DZ 27.721 (DZUP). *Minas Gerais*: **Alfenas** – 27-I-2012, 1 male, Brito leg., VPI2.2-214 (ZUEC). **Camanducaia** – Monteverde, 1650m, 8-II-1979, Ebert leg., ex-coll. Ebert, DZ 27.646 (DZUP); **Cambuquira** – 10-XII-1968, 1 male and 1 female, Ebert leg., ex-coll. Ebert, DZ 27.432, DZ 26.433 (DZUP); 12-X-1968, 1 female, Ebert leg., ex-coll. Ebert, DZ 26.434 (DZUP); 15-IX-1969, 1 female, Ebert leg., ex-coll. Ebert, DZ 27.647 (DZUP); **Conceição dos Ouros** – Rio Sapucaí, 24-II-1968, 1 female,

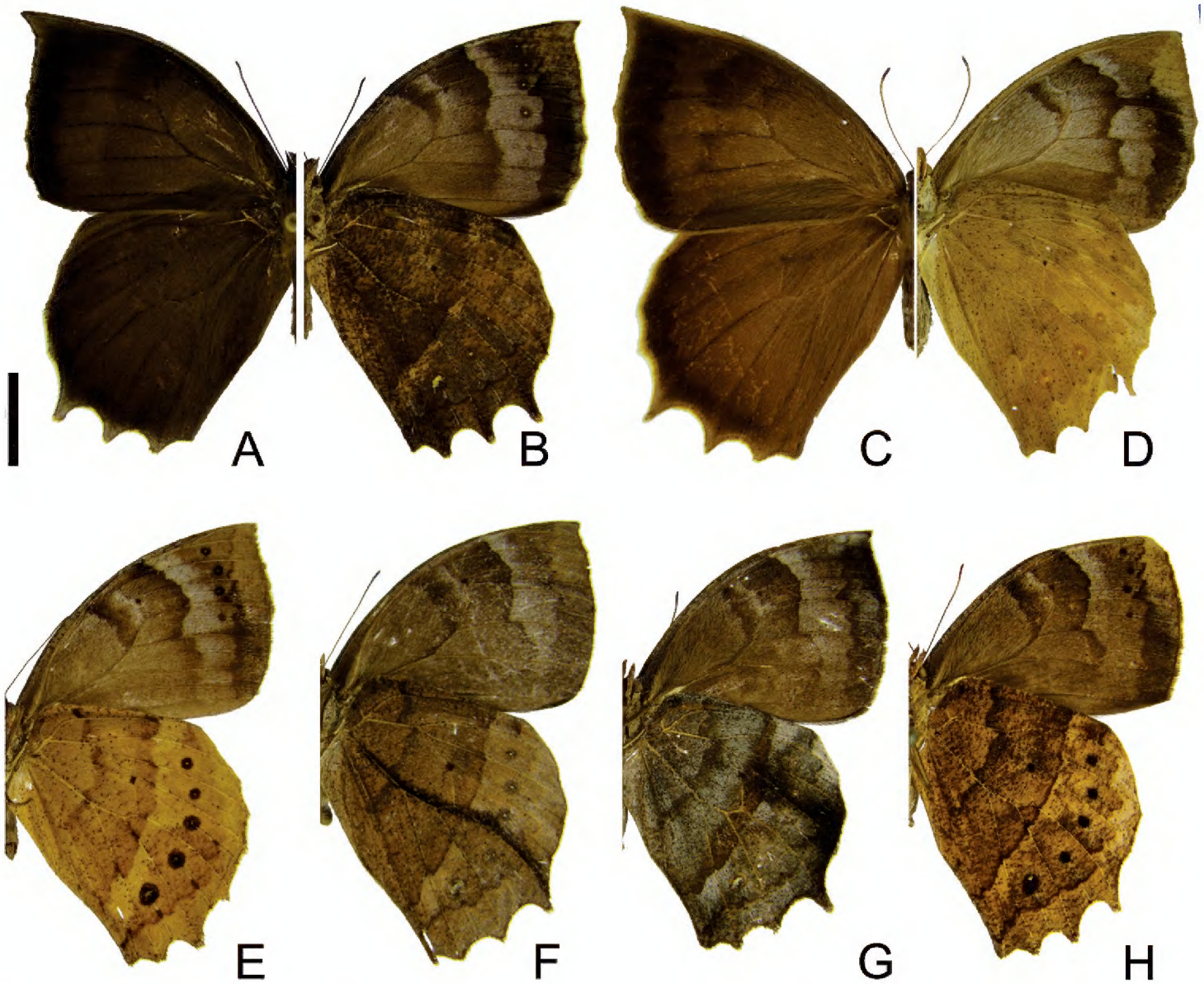

Figure 2. Adults of *Taygetis ypthima.* **A–B** male **A** dorsal view **B** ventral view **C–D** female **C** dorsal view **D** ventral view **E–H** variations in ventral view. Scale bar = 1 cm.

Ebert leg., ex-coll. Ebert, DZ 27.648 (DZUP); **Marliéria** – Parque Estadual do Rio Doce, 200 m, 08-IX-1972, 1 female, Ebert leg., ex-coll. Ebert, DZ 27.718 (DZUP); 16-III-1972, 1 male, H. & H. D. Ebert leg., ex-coll. Ebert, DZ 27.719 (DZUP). **Itamonte** – Vargem Grande, 1600m, 17-II-2010, 1 male, Mielke & Casagrande leg., DZ 27.554 (DZUP); NE side of Itatiaia, 1300m, II-1959, 1 male, Ebert *leg.*, ex-coll. Ebert, DZ 27.671 (DZUP); **Passa Quatro** – Paiolinho, Fazenda Serra Fina, 1600m, 16-II-2010, 1 male, Mielke & Casagrande leg., DZ 27.645 (DZUP); **Virgínia** – Fazenda dos Campos, 1500m, 13-15-II-2010, Mielke & Casagrande leg., DZ 27.540 (DZUP). *Rio de Janeiro*: **Nova Friburgo** – 1000m, 23-I-1983, 1 female, O.-C. Mielke leg., DZ 27.644 (DZUP); **Itatiaia** – 900m, 23-I-1936, 1 male, Gagarin leg., ex-coll. Gargarin, DZ 27.472; II-1958, 2 male, Ebert leg., ex-coll. Ebert, DZ 27.634, DZ 27.635 (DZUP); 1600m, 14-II-1956, 1 male and 2 females, Ebert leg., ex-coll. Ebert, DZ 27.637, DZ 27.638, DZ 27.639 (DZUP); Parque Nacional do Itatiaia, Maromba, 1100m, 06-09-II-2011, 1 female, Freitas leg., ZUEC LEP 5.372 (ZUEC); **Petrópolis** – Independência, 900m, 13-III-1933, 1 male, Gargarin leg., ex-coll. Gagarin, DZ 27.655 (DZUP); **Rio de Janeiro** – 14-XI-1920, 1 male, D'Almeida leg., ex-coll. D'Almeida, DZ 27.654 (DZUP); **Teresópolis** – 1600m,

20-II-1967, 1 female, Ebert *leg.*, ex-coll. Ebert, DZ 27.637 (DZUP). *São Paulo*: **Apiaí** – IV-1972, 1 male, Ebert leg., ex-coll. Ebert, DZ 27.636 (DZUP); **Campos do Jordão** – I.1966, 5 males and 3 females, without collector, DZ 27.369, DZ 27.579, DZ 27.588, DZ 27.589, DZ 27.591, DZ 27.597, DZ 27.602, DZ 27.603 (DZUP); 1600-2000m, 8-12-II-1982, 2 males, Mielke & Casagrande, DZ 27.587, DZ 27.595 (DZUP); Parque Estadual Campos do Jordão, 1950m, 10-II-1968, 2 males, Mielke, Brown & Laroca leg., DZ 27.593, DZ 27.600 (DZUP); 1800m, 11-12-I-2001, 1 female, Brown & Freitas leg. (ZUEC-AVLF); **Capão Bonito** – Fazenda Intervales, Sede, 950-1100m, 30-XII-1989, 1 female, Freitas leg. (ZUEC-AVLF); 15-II-2000, 2 females, Brown, Freitas, Francini & Uehara-Prado leg., ZUEC LEP 1.776 (ZUEC); 13-XII-2000, 1 male and 1 female, Brown, Freitas, Francini & Uehara-Prado leg., ZUEC LEP 4.731, ZUEC LEP 4.732 (ZUEC); 5-6-XII-2001, 1 male and 1 female, Brown & Freitas leg. (ZUEC-AVLF); 15-I-2002, 1 female, Brown, Freitas, Francini & Uehara-Prado leg., ZUEC LEP 802 (ZUEC); 17-I-2003, 2 males and 2 females, Brown, Freitas, Francini & Uehara-Prado leg., ZUEC LEP 1.028, ZUEC LEP 1.547, ZUEC LEP 1.548, ZUEC LEP 1.549 (ZUEC); 19-I-2003, 3 males, Brown, Freitas & Uehara-Prado leg., ZUEC LEP 1.180, ZUEC LEP 1.286, ZUEC LEP 1.305 (ZUEC); **Cotia** – Morro Grande, 900-1100m, 15-III-2000, 1 female, Uehara-Prado & Freitas leg. (ZUEC-AVLF); 22-XII-2000, 1 female, Brown & Uehara-Prado leg. ZUEC LEP 1.781 (ZUEC); **Imbariê** – 7-I-1956, 1 female, Ebert leg., ex-coll. Ebert, DZ 27.633 (DZUP); **Jundiaí** – Serra do Japi, 11-V-2012, 1 female, Santos leg., BLU 246 (ZUEC); **Piquete** – Barreira de Piquete, 1400-1600m, 15-II-1984, 2 males, Mielke & Casagrande *leg.*, DZ 27.585, DZ 27.596 (DZUP); **Presidente Venceslau** – without date, 2 males and 4 females, D'Almeida leg., DZ 27.656, DZ 27.657, DZ 27.658, DZ 27.659, DZ 27.660, DZ 27.661 (DZUP); **Rio Claro** – 60m, 6-I-1964, 5 males and 1 female, Ebert leg., ex-coll. Ebert, DZ 27.392, DZ 5.500, DZ 27.663, DZ 27.630, DZ 27.631, DZ 27.632 (DZUP); 16-V-1965, 1 male, Ebert leg., ex-coll. Ebert, DZ 27.662 (DZUP); **Salesópolis** – Estação Biológica da Boraceia, 900m, 21-II-2006, 1 male, Uehara-Prado & Freitas leg. (ZUEC-AVLF); 27-III-2006, 1 male, Uehara-Prado & Freitas leg. (ZUEC-AVLF); **Umuarama** – 1800m, 8-15-III-1937, 8 males and 2 females, Gargarin leg., ex-coll. Gagarin, DZ 27.584, DZ 27.586, DZ 27.590, DZ 27.592, DZ 27.593, DZ 27.594, DZ 27.598, DZ 27.599, DZ 27.601, DZ 27.632 (DZUP). *Paraná*: **Foz do Iguaçu** – 250m, 17-II-1969, 3 males, Moure & Mielke leg., DZ 26.741, DZ 1.626, DZ 27.368 (DZUP); 10-X-1969, 1 male, Krause leg., DZ 26.740 (DZUP); Parque Nacional do Iguaçu, 21-24-IV-1996, 2 females, Mielke & Casagrande leg., DZ 26.743, DZ 26.769 (DZUP); **Curitiba** – 900m, 20-III-1980, 1 male, O. Mielke leg., DZ 27.405 (DZUP); Uberaba, Tirol das Torres, 900m, 5-II-2010, 1 female, O. Mielke leg., DZ 26.742 (DZUP); **Rolândia** – Rio Tibagi, 750m, XII-1941, 1 male, Waltz leg., DZ 27.397 (DZUP). *Santa Catarina*: **Canoinhas** – I, 1 male, Pohl *leg.*, DZ 27.667 (DZUP); 16-IX-1941, 1 male, Schimith *leg.*, DZ 27.668 (DZUP); **Ibirama** – I, 1 male, Pohl leg., DZ 27.666 (DZUP); VIII, 1 female, Pohl *leg.*, DZ 27.670 (DZUP); XII, Pohl *leg.*, DZ 27.669 (DZUP); **Itaiópolis** – 26-III-1937, 1 male, D'Almeida leg., ex-coll. D'Almeida, DZ 27.549 (DZUP); **Itajaí** – Agrolândia, 400m, II-1973, 1 female, Wulff leg., DZ 27.665 (DZUP); **Joinville** – 5-III-1974, 1 male, O. Mielke leg., DZ 26.778 (DZUP);

São Bento do Sul – Rio Vermelho, 850m, 10-IV-1980, 1 female, Rank leg., DZ 27.640 (DZUP); 950m, 23-I-1982, 1 male, Rank leg., DZ 26.815 (DZUP); 650m, 30-I-1982, 1 male, Rank leg., DZ 26.816 (DZUP); 850m, 7-XII-1969, 1 male, Ebert leg., ex-coll. Ebert, DZ 27.649 (DZUP); 8-I-1971, Ebert leg., ex-coll. Ebert, DZ 27.643 (DZUP); 10-I-1971, 1 female, Ebert leg., ex-coll. Ebert, DZ 27.641 (DZUP); 7-VIII-1971, Ebert leg., ex-coll. Ebert, DZ 27.650 (DZUP); 3-X-1971, 1 female, Ebert leg., ex-coll. Ebert, DZ 5.499 (DZUP); 5-XII-1969, 1 male and 1 female, Ebert leg., ex-coll. Ebert, DZ 27.642, DZ 27.651 (DZUP); 6-XII-1969, 1 male and 1 female, Ebert leg., ex-coll. Ebert, DZ 26.429, DZ 27.653 (DZUP); 4-III-1980, 1 male, Ebert leg., ex-coll. Ebert, DZ 27.652 (DZUP); 8-V-1980, 1 male, Rank *leg.*, DZ 27.664 (DZUP); **Taió** – February, 1 male, Pohl *leg.*, DZ 27.666 (DZUP). *Rio Grande do Sul*: **São José do Inhacorá** – Alto Uruguai, 2-V-1980, 1 male, Steiniger leg., DZ 26.770 (DZUP). PARAGUAY – *General Dias*: **Itaquiri** – 400m, 15-20-I-1980, 5 males and 5 females, O.-C. Mielke & Myers *leg.*, DZ 27.708, DZ 27.709, DZ 27.710, DZ 27.711, DZ 27.712, DZ 27.713, DZ 27.714, DZ 27.715, DZ 27.716, DZ 27.717 (DZUP). ARGENTINA – *Corrientes*: **Santo Tomé** – I-1924, 1 male, D'Almeida leg., ex-coll. D'Almeida, DZ 27.522 (DZUP). *Misiones*: **General Manuel Belgrano** – Almirante Brown, Reserva Yacutinga, 2-5-III-2007, 1 male, Mielke & Casagrande leg., DZ 27.531 (DZUP). *Tucumán*: **Ibatim** – Pueblo Viejo, 850m, 25-I-1970, 1 female, O. Mielke leg., DZ 27.707 (DZUP).

Diagnosis. *T. ypthima* can be distinguished from *T. drogoni* by the forewing underside submarginal band, not conspicuously constricted at M_3; the proximal line is oblique in M_3-CuA_1 to the direction of the base of the wing, disjointed of the remainder of the line from CuA_1 to the inner margin; submarginal band irregular, but about the same width from M_1 to the inner margin, sometimes slightly wider at M_3-CuA_1; hind wing underside with the discal line curved and irregular, extending from the costal margin to the inner margin; and proximal line of the submarginal band distinctly curved and irregular. Tegumen smaller; valva thinner and longer, with a smaller dorsal rough area. Signa ventral; laterally, sternum VIII fused with tergum VIII; lamella antevaginalis with two lateral process.

Distribution (Fig. 8). Occurs in northeastern, southeastern and southern Brazil, and also in Paraguay and Argentina, from sea level to 2000 m a.s.l. Based on label data, adults are present all year round.

Taxonomic comments. This is the commonest and more widespread species of the group. The high intraspecific variation observed in *T. yphtima* yield a number of descriptions of local forms or synonyms: *T. xantippe* Butler, [1870], *T. ophelia* Butler, 1870; *T. ophelia* f. *semibrunnea* Weymer, 1910 and *T. ypthima* [*sic*] ab. *lineata* Kivirikko, 1936, all synonyms of *T. ypthima* (Lamas 2004; Warren et al. 2013). Based on collected specimens, different phenotypes associated with these taxonomic names frequently occur in a same locality. Furthermore, the genitalia of these specimens are exactly alike the genitalia of typical *T. ypthima.* Nonetheless, *Taygetis fulginia* D'Almeida, 1922, until recently considered a synonym of *T. ypthima* (Lamas *op. cit.*), is in fact a valid species, with clear differences on morphology of male and female genitalia and wing pattern (see below).

***Taygetis rectifascia* Weymer, 1907**
http://species-id.net/wiki/Taygetis_rectifascia
Figs 3A–G; 6K–O; 7E,F

Examined material. BRASIL – *Rio de Janeiro*: **Rio de Janeiro** – Mangaratiba - 12-VIII-1926, 1 female, D'Almeida leg., ex-coll. D'Almeida, DZ 26.426 (DZUP); **Itatiaia** - Parque Nacional do Itatiaia, 1200m, 25-II-1959, 1 male, Ebert leg., ex-coll. Ebert, DZ 27.490 (DZUP); 1000-1200m, 25-VII-1963, 1 male, Ebert leg., ex-coll. Ebert, DZ 26.417 (DZUP); 1100m, 4-II-1966, 1 male, Ebert leg., ex-coll. Ebert, DZ 27.469 (DZUP); 110m, 29-III-1967, Ebert leg., ex-coll. Ebert, DZ 5.502 (DZUP); 1000-1200m, 25-VII-1968, 1 male, Ebert leg., ex-coll. Ebert, DZ 27.346 (DZUP). *São Paulo:* **Capão Bonito** – Fazenda Intervales, Sede, 950m, 28-XII-1989, 1 male, Freitas leg. (ZUEC-AVLF); 30-XII-1989, 1 male, Freitas leg. (ZUEC-AVLF); 15-II-2000, 3 males and 3 females, Brown, Freitas, Francini & Uehara-Prado leg., ZUEC LEP 1.777, ZUEC LEP, 1.778, ZUEC LEP 1.779, ZUEC LEP 1.780, ZUEC LEP 1.782, ZUEC LEP 1.785 (ZUEC); 13-XII-2000, 3 males and 3 females, Brown, Freitas, Francini & Uehara-Prado leg., ZUEC LEP 4.730, ZUEC LEP 4.733, ZUEC LEP 4.734, ZUEC LEP 4.735, ZUEC LEP 4.736 (ZUEC); 5-6-XII-2001, 1 male and 4 females, Brown & Freitas leg. (ZUEC-AVLF); 17-20-I-2003, 3 males, Brown, Freitas & Uehara-Prado leg., ZUEC LEP 1.188, ZUEC LEP 1.189, ZUEC LEP 1.550 (ZUEC); **Salesópolis** – Estação Biológica da Boraceia, 900m, 28-IV-2006, 1 male, Uehara-Prado & Freitas leg. (ZUEC-AVLF); *Paraná*: **Campina Grande do Sul** – 13.III.1982, 2 males and 2 female, Mielke & Casagrande leg., DZ 26.430, DZ 27.519, DZ 27.532, DZ 27.534 (DZUP); *Santa Catarina*: **Taió** – I, 1 male, Pohl leg., DZ 27.382; **Presidente Getúlio** – Dalbérgia, 1 male, December, Pohl leg., DZ 26.425 (DZUP); **São Bento do Sul** – Rio Natal, IV-2012, 1 male, Rank leg., DZ 27.449 (DZUP).

Diagnosis. *T. rectifascia* can be distinguished from *T. fulginia* and other species of the genus by the following combination of characters: forewing pointed at the apex; hind wing, with small projections at M_3, CuA_1 and CuA_2; dorsal wings brown with thin suffused dark brown bands about 2 mm away from and along the outer margin; ventral hind wing with the proximal border of the submarginal band and post discal line straight and slightly irregular, sometimes forming a creamy white fascia of varying width. The base of the gnathos presents a ventral pointed projection, similar to *T. fulginia* and *T. servius* stat. n. The male genitalia differ from all other species discussed in the present paper by the shape of the valvar end, which is bifid and claw-shaped (presenting large intraspecific variation).

Distribution (Fig. 8). Occurs in southeastern and southern Brazil (Rio de Janeiro, São Paulo, Paraná and Santa Catarina), at elevations from 300 to 1,200 m a.s.l. Based on label data, adults are present all year round.

Taxonomic comments. Despite its superficial resemblance to *T. fulginia*, this species presents a very distinctive genitalia. *T. rectifascia* presents strong intraspecific variation in the wing pattern, which in the past has motivated the description of several aberrations and forms: *Taygetis rectifascia* ab. *stigma* Weymer, 1907; *Taygetis rectifascia*

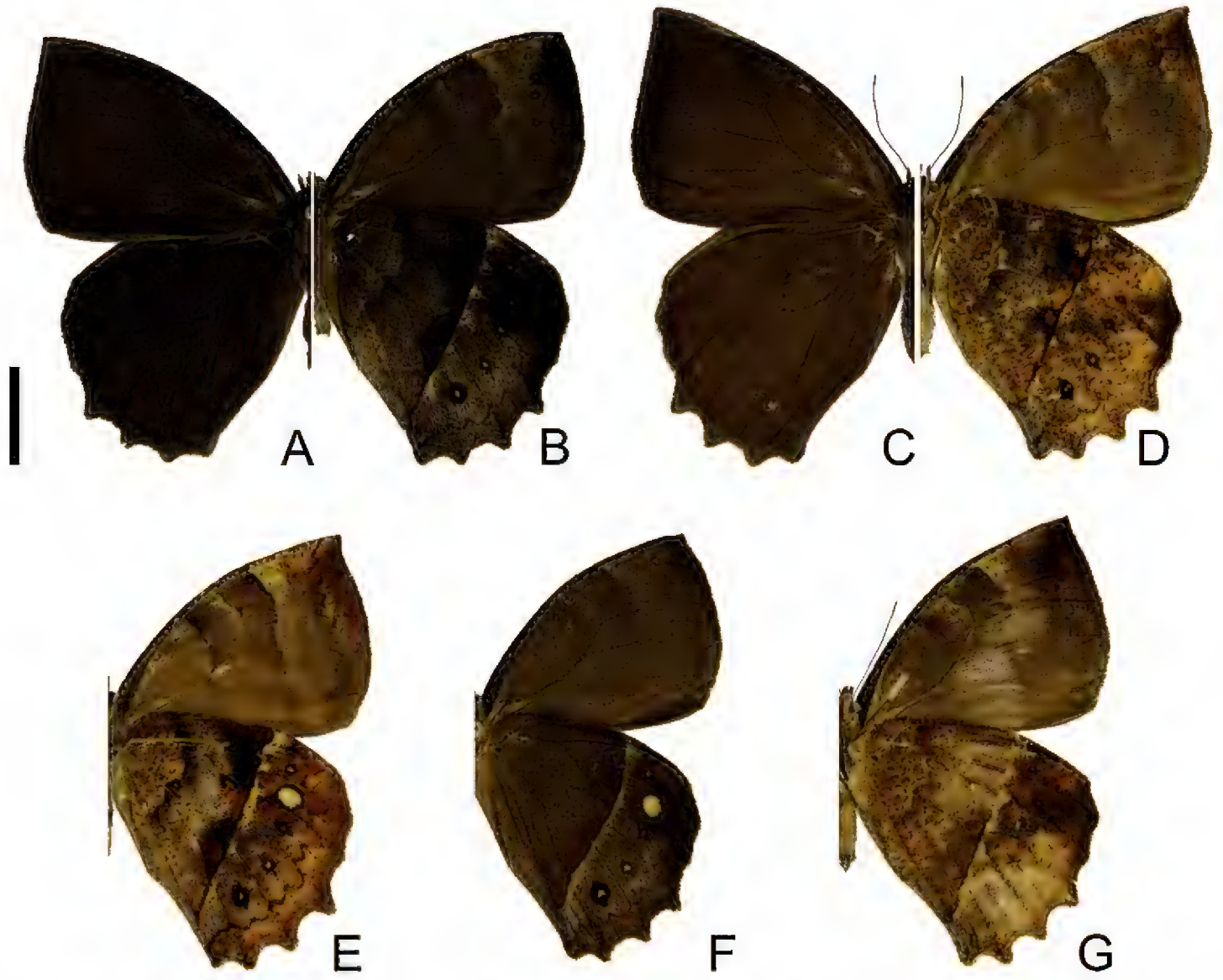

Figure 3. Adults of *Taygetis rectifascia.* **A–B** male **A** dorsal view **B** ventral view **C–D** female **C** dorsal view **D** ventral view **E–G** variations in ventral view. Scale bar = 1 cm.

ab. *latifascia* Weymer, 1907 (all synonyms of *T. rectifascia*) (Warren et al. 2013). *Taygetis epithyma* Forster, 1964 is a *nomem nudum*. The genitalia of these different phenotypes are alike the genitalia of typical *T. rectifascia.*

***Taygetis servius* Weymer, 1910, stat. n.**
Figs 4A–D, 6P-T; 7G–H

Examined material. BRAZIL – *Bahia:* **Jitaúna** - 26-III-1969, 2 males and 2 females, Ebert leg., ex-coll. Ebert, DZ 26.424, DZ 27.440, DZ 27.396, DZ 27. 386 (DZUP). *Espírito Santo:* **Baixo Guandú** - 10-IV-1970, 1 male, Elias leg., DZ 26.806 (DZUP).

Diagnosis. *T. servius* stat. n. can be distinguished from *T. fulginia* stat. r. and *T. rectifascia* by the following characters: forewing rounded at the apex; dorsal wings light brown without any suffused dark brown bands along the outer margin; ventral hind wing with the proximal border of the submarginal band and post discal line straight and regular, forming a 2 mm wide creamy white fascia. The base of the gnathos presents a pointed ventral projection, as in *T. rectifascia* and *T. fulginia*, but differs from

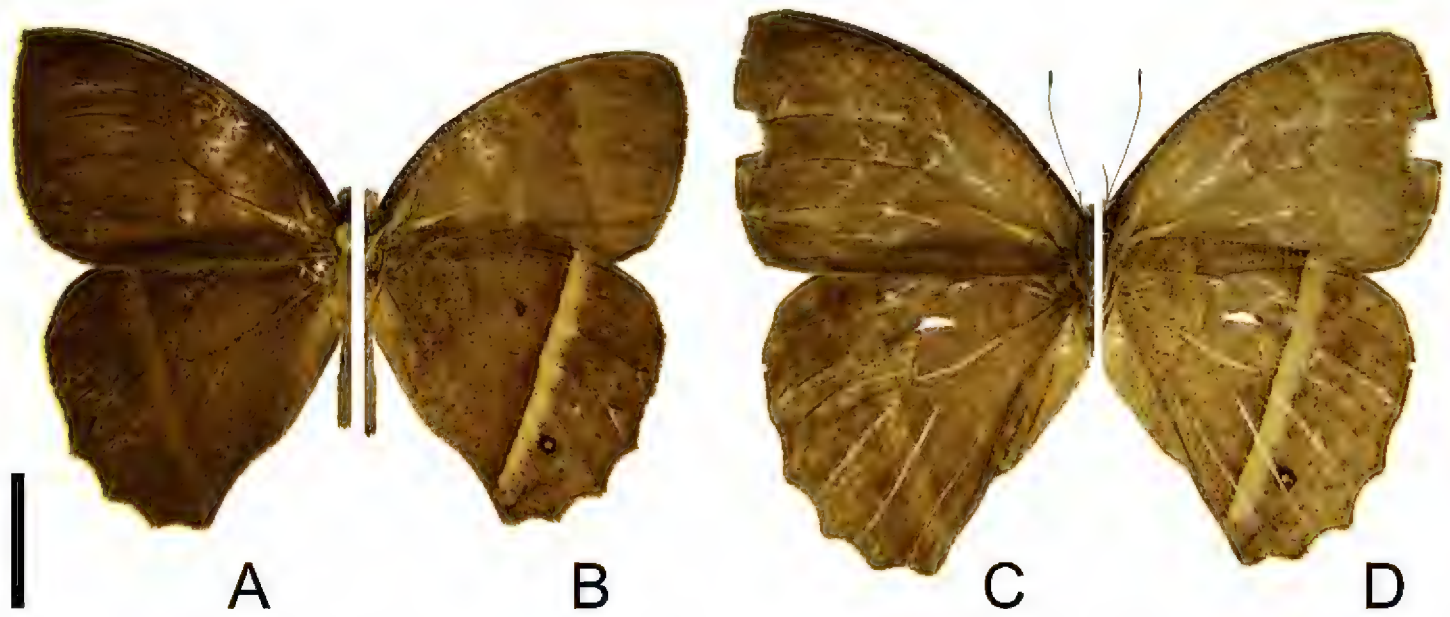

Figure 4. Adults of *Taygetis servius* stat. n. **A–B** male **A** dorsal view **B** ventral view **C–D** female **C** dorsal view **D** ventral view. Scale bar = 1 cm.

T. rectifascia by the absence of the claw-shaped bifid valva apex, and from *T. fulginia* by its stouter valva, with a shorter but wider distal projection of the valva. In additional, *T. servius* is considerably smaller than the other species treated in the present paper.

Distribution (Fig. 8). *T. servius* is known from Baixo Guandú (Espírito Santo), and from Jitaúna (Bahia). It should also be present in Minas Gerais (see below).

Taxonomic comments. *Taygetis servius* stat. n. was described from an unknown number of specimens from Minas Gerais, Brazil, as a form of *T. rectifascia* (Weymer, 1910: 187). Although clearly recognized as such, the illustration of *T. servius* (Weymer, 1910: pl. 46, fig. c [3]) is placed in another plate, separated from the rest of the illustrations of *T. rectifascia* and its forms (Weymer 1910: pl. 45, fig. a [1-2]). The description and the illustration matches exactly a series of five specimens from the states of Espírito Santo and Bahia, Brazil, deposited at the DZUP. Wing shape and pattern, also acknowledged by Weymer, and examination of the genitalia confirms it as a distinct species. The type specimen (or specimens) of *T. servius* is missing, however, type specimens of other species of *Taygetis* described by Weymer in the same fascicle of Die Gross-Schmetterlinge der Erde are housed at the SMT and ZSM collections (i.e. *T. mermeria* f. *crameri* (Weymer, 1910), at SMT, and *Taygetina banghaasi* (Weymer, 1910), at ZSM). However, previous and recent searches for type specimens carried out by G. Lamas, O.H.H. Mielke and the curators of the above cited collections did not produce any specimens (Nekrutenko 2001).

Taygetis fulginia d'Almeida, 1922, stat. r.

Figs 5A–D; 6U–Y; 7I,J

Type material. Holotype male with the following labels: /HOLOTYPUS/ *Taygetis fulginia* d'Almeida, 1922 /M(#)/ 30-X-1921 Parada Caramujos, E. F. C. B. [Estação de Ferro Central do Brasil] [Japeri] [22°38'34"S, 43°39'10"W] Estado do Rio [de Janeiro] Ferreira d'Almeida leg. /N°5163/ DZ 27.378/ (DZUP).

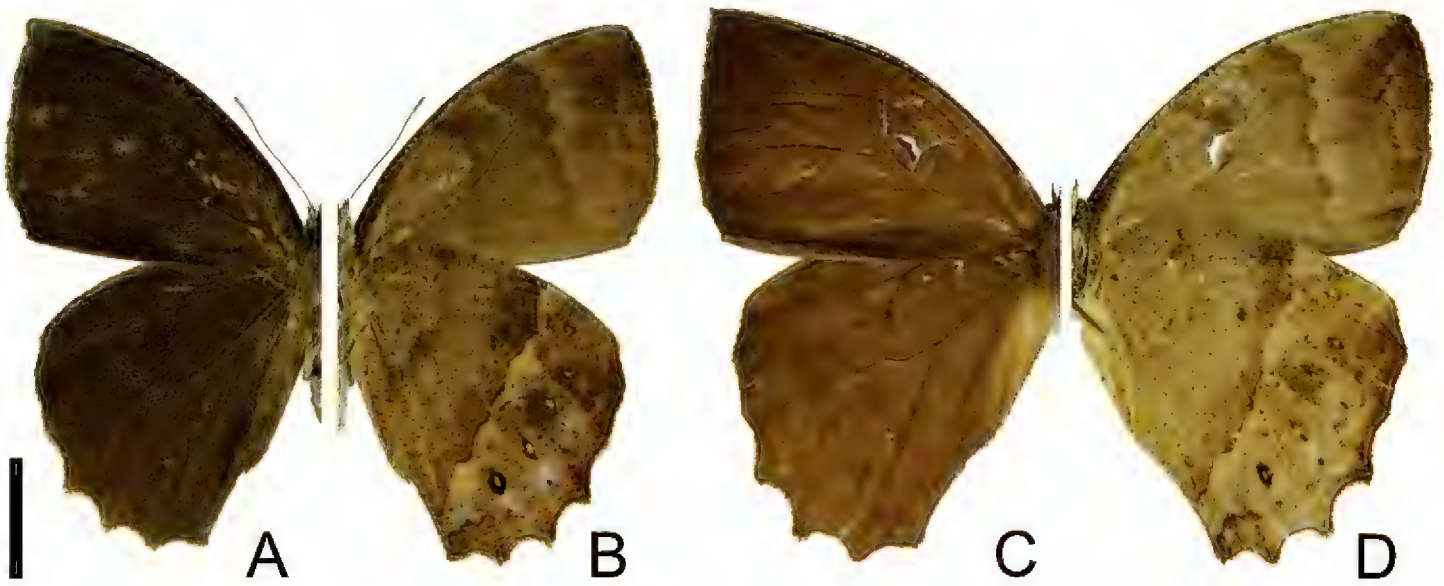

Figure 5. Adults of *Taygetis fulginia* stat. r. **A–B** male **A** dorsal view **B** ventral view **C–D** female **C** dorsal view **D** ventral view. Scale bar = 1 cm.

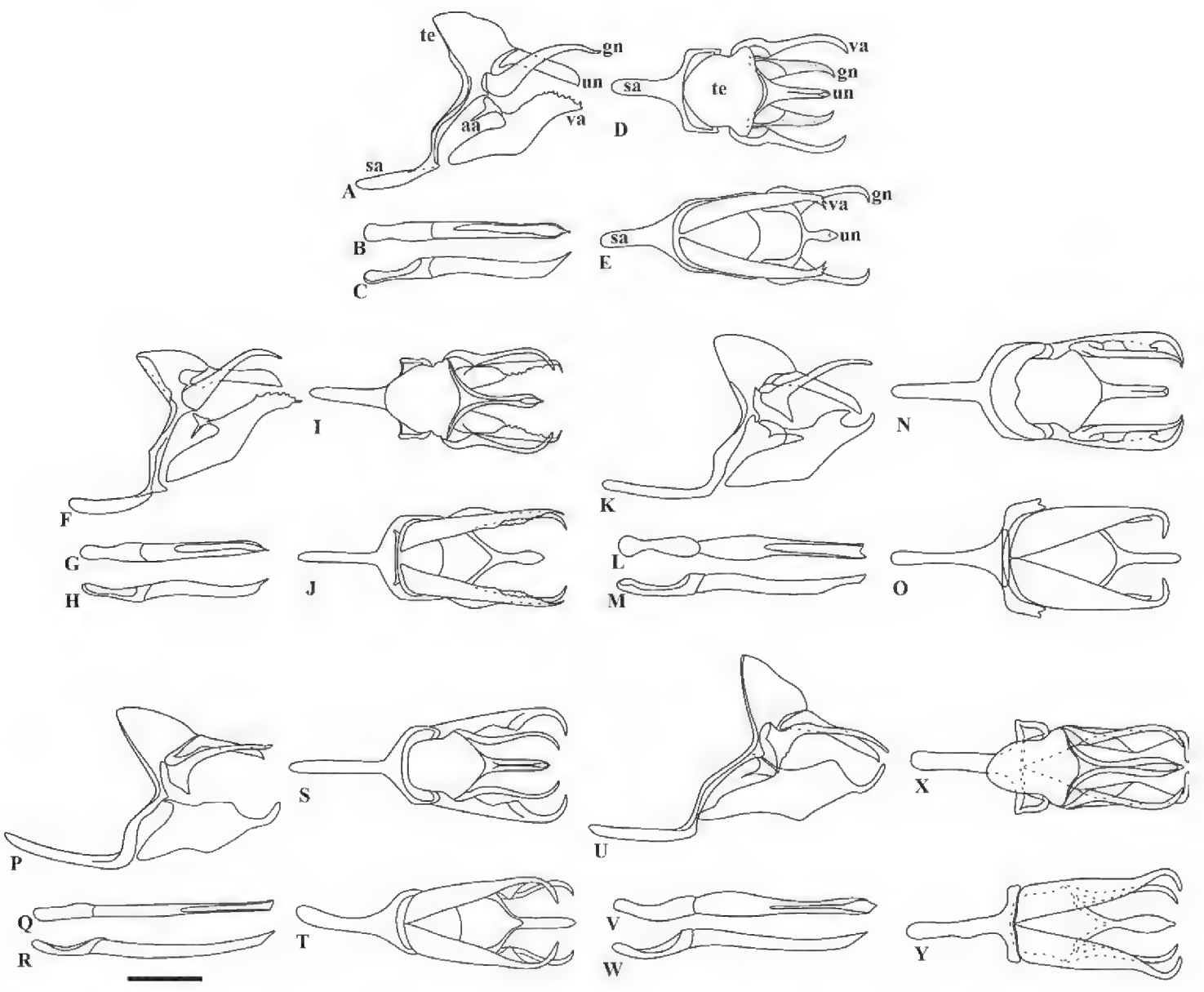

Figure 6. Male genitalia of *Taygetis*. **A–E** *T. drogoni* sp. n. **A** lateral view **B–C** aedeagus: **B** ventral **C** lateral **D** dorsal view **E** ventral view **F–J** *T. ypthima* **F** lateral view **G–H** aedeagus: **G** ventral **H** lateral **I** dorsal view **J** ventral view **K–O** *T. rectifascia* **K** lateral view **L–M** aedeagus:**L** ventral **M** lateral **N** dorsal view **O** ventral view **P–T** *T. servius* stat. n. **P** lateral view **Q–R** aedeagus: **Q** ventral **R** lateral **S** dorsal view **T** ventral view **U–Y** *T. fulginia* **U** lateral view **V–W** aedeagus: **V** ventral **W** lateral **X** dorsal view **Y** ventral view. Abbreviations: **aa** appendix angular; **gn** gnathos; **sa** saccus; **te** tegumen; **un** uncus; **va** valva. Scale bar = 1 mm.

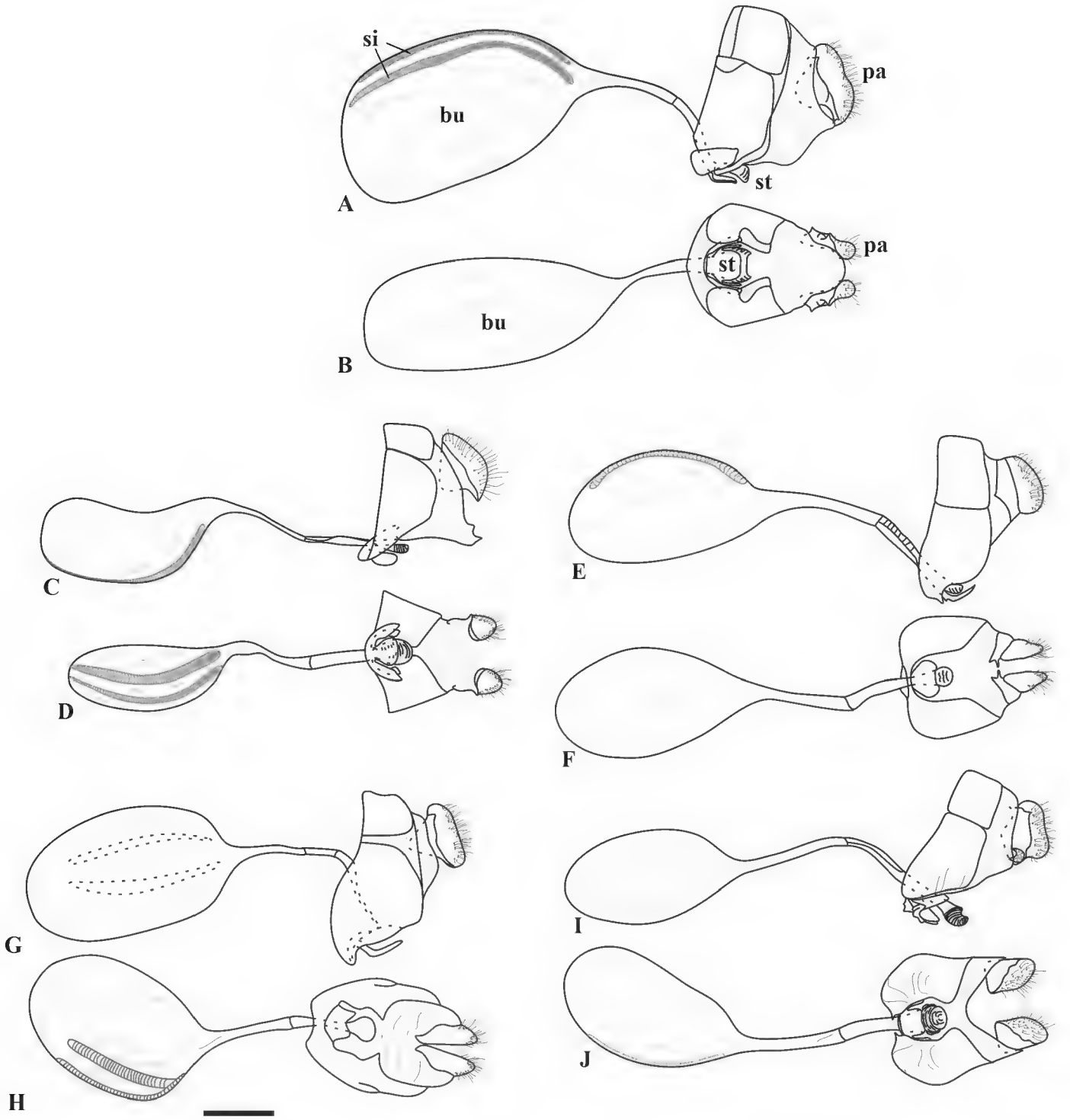

Figure 7. Female genitalia of *Taygetis.* **A–B** *T. drogoni* sp. n. **A** lateral view **B** ventral view **C–D** *T. ypthima* **C** lateral view **D** ventral view **E–F** *T. rectifascia* **E** lateral view **F** ventral view **G–H** *T. servius* stat. n. **G** lateral view **H** ventral view **I–J** *T. fulginia* **I** lateral view **J** ventral view. Abbreviations: **bu** corpus bursae; **pa** papilla analis; **si** signa; **st** sterigma. Scale bar = 1 mm.

Additional examined material. BRAZIL – *Minas Gerais:* **Marliéria** – Parque Estadual do Rio Doce, 250 m, 14-V-1974, 2 males, Ebert leg., ex-coll. Ebert, DZ 26.418, DZ 27.524 (DZUP); 17-V-1974, 1 male, Ebert leg., ex-coll. Ebert, DZ 26.821 (DZUP). *Rio de Janeiro:* **Rio de Janeiro** – Horto Florestal – 01-VIII-1932, 1 female, Gagarin leg., ex-coll. Gagarin, DZ 27.416 (DZUP). *São Paulo:* **Ubatuba –** Parque Estadual da Serra do Mar, Núcleo Picinguaba, 0-100m, 30-IX-2001, 1 male, Brown & Freitas leg. DNA voucher BLU 443 (ZUEC-AVLF).

Diagnosis. *T. fulginia* can be distinguished from *Taygetis ypthima* and other species of the genus by the following characters: in size it is slightly smaller, the forewing is only slightly pointed at the apex, the hind wing has smaller projections at M_3, CuA_1 and CuA_2,

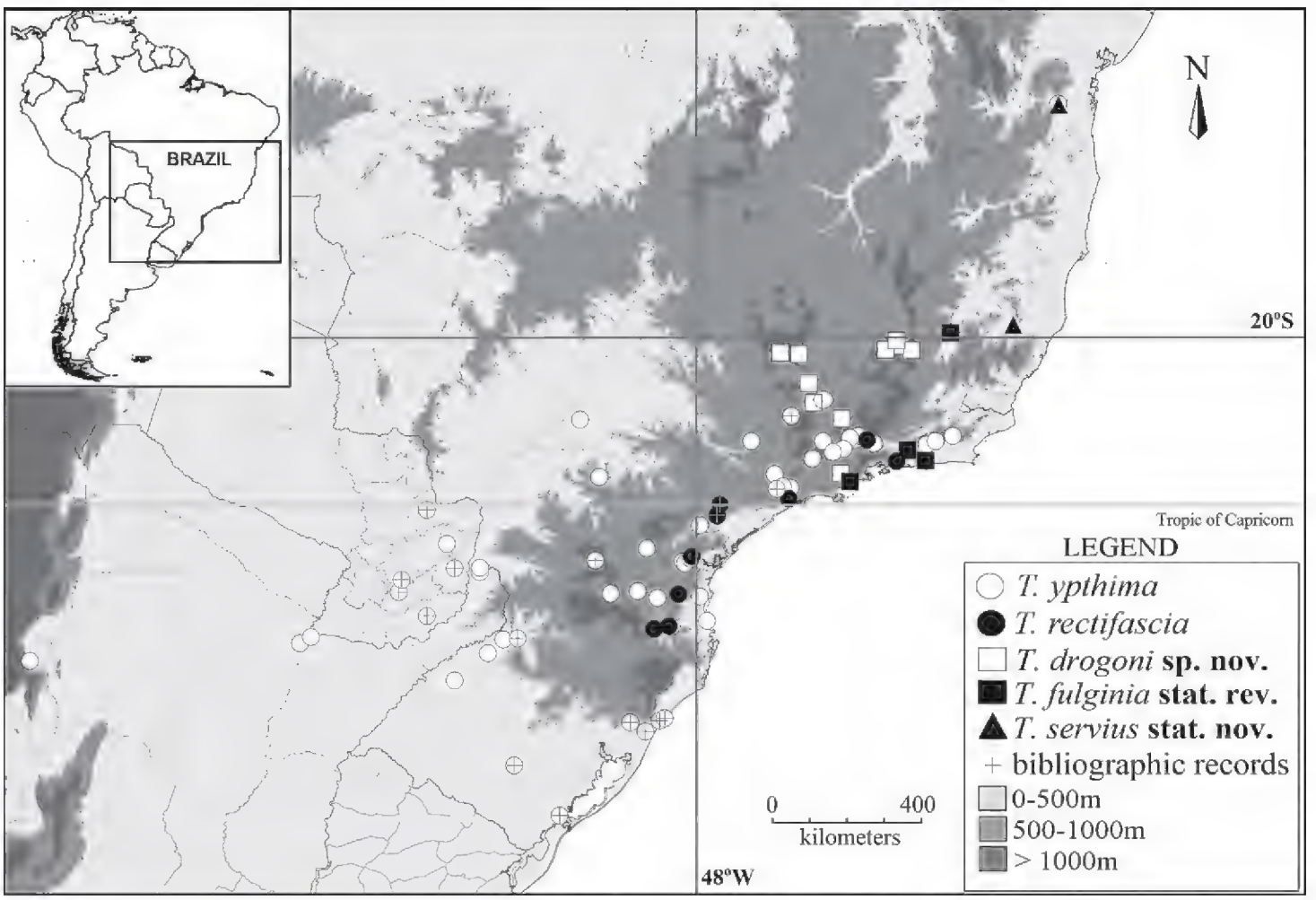

Figure 8. Geographical distribution of the species in the "*Taygetis ypthima* species group".

similar to *T. servius* stat. n., the dorsal wings lack suffused dark brown bands along the outer margin. The base of the gnathos presents a ventral pointed projection, as in *T. rectifascia* and *T. servius* stat. n., but *T. fulginia* differs from the former by the absence of a developed dorsal projection on the valva, and from the latter by the longer and thinner distal projection of the valva, which is also longer and with a dorsally protruding area in *T. fulginia*.

Distribution (Fig. 8). This species occurs in southeastern Brazil (Minas Gerais, Rio de Janeiro and São Paulo), from sea level to 250m.

Taxonomic comments. The description of *T. fulginia* was based on a single specimen in the D'Almeida collection, now deposited at DZUP (see above). This species was previously considered a synonym of *T. ypthima*, but the morphological study confirms its specific status and indicates closer relationship with *T. rectifascia* and *T. servius* stat. n.

Key to males and females of the "*Taygetis ypthima* species group"

A combination of wing shape and color pattern permits identification of all five species without dissection, and genitalia of both sexes (not included here but discussed in the text) provide diagnostic characters for all species.

1 Forewing upper side with suffused dark brown marginal band developed (Figs 1A, C; 2A, C); hind wing with long projections at CuA_1, CuA_2 and 2A (Figs 1, 2) **2**

– Forewing upper side with suffused dark brown marginal band reduced (Fig. 3A, C) or absent (Figs 4A, C; 5A, C); hind wing with short projections at CuA_1, CuA_2 and 2A (Figs 3, 4, 5) **3**

2 Forewing underside submarginal band constricted at M_3 and reduced or absent in CuA_1-CuA_2 (Fig. 1B, D); hind wing underside with the discal line evenly curved and regular; dark post discal line straight and more or less regular (Fig. 1B, D) ..... ***T. drogoni* sp. n.**

– Forewing underside submarginal band not constricted at M_3 (Fig. 2B, D); hind wing underside with the discal line irregular; post discal line distinctly irregular and not straight (Fig. 2B, D) ..... ***T. ypthima***

3 Forewing apex conspicuously pointed (Fig. 3 A–G); forewing upper side with suffused dark brown marginal band reduced (Fig. 3A, C) ..... ***T. rectifascia***

– Forewing apex rounded (Fig. 4A–D) or slightly pointed (Fig. 5A–D); forewing upper side with suffused dark brown marginal band absent (Figs 4A, C; 5A, C) **4**

4. Ventral hind wing with the proximal border of the submarginal band and post discal line straight and regular, forming an even 2 mm wide creamy white fascia; hind wing with projections at CuA_1, CuA_2 and 2A strongly reduced (Fig. 4B, D) ..... ***T. servius* stat. n.**

– Ventral hind wing with the proximal border of the submarginal band and post discal line irregular, forming an irregular creamy white fascia (Fig. 5B, D) ..... ***T. fulginia* stat. r.**

Discussion

The "*Taygetis ypthima* species group" is not part of the genus *Taygetis*, but in fact a clade related to the genus *Pseudodebis* Forster, 1964 (including *Taygetomorpha* L. D. Miller, 2004) in the "*Pseudodebis* subclade" of Matos-Maraví et al. (2013). Four species are certainly part of this clade based on molecular data, namely *T. ypthima*, *T. drogoni* sp. n. (=*Taygetis ypthima* PM10-02 of Matos-Maraví et al. 2013), *T. rectifascia* and *T. fulginia* stat. r., and one additional species was here treated as part of this group based on morphological similarities, *T. servius* stat. n.

The five species treated here can be easily distinguished from one another by wing pattern and genitalia, and two main subgroups can be identified based on morphology - group 1, composed of *T. ypthima* and *T. drogoni* sp. n., and group 2, composed by *T. rectifascia*, *T. fulginia* stat. r. and *T. servius* stat. n. Species in group 2 can be distinguished from those of the group 1 by bearing shorter tails at M_3, CuA_1 and CuA_2, by the lighter dorsal ground color of wings, and by a clear reduction (*T. rectifascia*) or total absence (*T. fulginia* stat. r. and *T. servius* stat. n.) of the suffused dark brown marginal bands. The base of the gnathos in the species of the group 2 presents a conspicuous ventral projection, and there is a longer saccus and aedeagus, and a relatively shorter posterior opening of the aedeagus. Wing color and pattern present conspicuous

intraspecific variability in all five species treated here, especially in *T. ypthima* and *T. rectifascia* (Warren et al. 2013), and thorough studies including additional sources of informative characters, e.g. molecular data, might reveal hidden taxonomic diversity.

Although species in the "*Taygetis ypthima* species group" are not part of the genus *Taygetis* (a fact also reinforced by karyological data, see Brown et al. 2007), a taxonomic revision of *Taygetis* and related taxa is not yet available. The lack of such revision is an impediment for eventual species delimitation and the assessment of intraspecific variation as well as the usage of generic synapomorphies. In addition, the diagnosis of many genera within Euptychiina have mostly relied on wing shape and pattern of genitalia (e.g. Forster 1964), making it a hard task to correctly assign species to a genus. As a result, most recent taxonomic rearrangements within Euptychiina are based on DNA sequence data. For example, *Taygetomorpha* L. Miller, 2004 has been recently synonymized with *Pseudodebis* Forster, 1964 (Matos-Maraví et al. 2013), based only on molecular data and larval morphology (Matos-Maraví et al. 2013, Murray 2001a), with no clear adult synapomorphies yet identified.

The present study revealed that morphological characters, such as wing shape and pattern, and male and female genitalia, were efficient to provide clear-cut species delimitation. However, further detailed morphological studies on Euptychiina are highly required to clarify the species and genera delimitations within the subtribe. As clear morphological keys are generated, several monophyletic groups are easily identified using informative synapomorphies (Freitas 2007, Freitas et al. 2010, Zacca et al. 2013). Nonetheless, because of this lack of information, the description of a new genus for the five species treated here would be premature.

Acknowledgements

We are grateful to Gerardo Lamas and Keith Willmott for critical reading of the manuscript. Axel Hausmann (ZSM), Marcelo Duarte (MZUSP), Fernando Silveira (UFMG), Wolfgang Nässig (SMFL), Jessie Pereira dos Santos, Mariana Monteiro de Brito and André Roberto Melo Silva provided additional distributional data and/or information about the type species. R. R. S., T. Z. and F. M. S. D. acknowledge the CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico) for research fellowships. A. V. L. F. acknowledges support from FAPESP (Biota-Fapesp - grant 2011/50225-3), from the Brazilian Research Council - CNPq (fellowship 302585/2011-7, and "SISBIOTA-Brasil/CNPq grant 563332/2010-7), and from the National Science Foundation, USA (DEB-1256742).

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